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10EME14

First Semester B.E. Degree Examination, January 2011
Elements of Mechanical Engineering

Time: 3 hrs. Max. Marks:100

Note: 1. *Answer any FIVE full questions, choosing at least two from each part.*
2. *Answer all objective type questions only on OMR sheet page 5 of the answer booklet.*
3. *Answer to objective type questions on sheets other than OMR will not be valued.*
4. *Use of steam tables is not permitted.*

PART – A

1 a. Choose the correct answer :

i) In which case, the potential energy is converted into the mechanical energy
A) Hydel energy B) Solar energy C) Wind energy D) Nuclear energy

ii) The flow of steam inside the boiler is regulated by
A) Feed check valve B) Blow off cock C) Safety valve D) Stop valve.

iii) Enthalpy of wet steam is determined by (with usual notations)
A) $h_g = h_f + h_{fg}$ kJ/kg B) $h = h_f + x.h_{fg}$ kJ/kg
C) $h_{sup} = h_g + c_{ps}(T_{sup} - T_s)$ kJ/kg D) $x = m_g / (m_f + m_g)$

iv) Boiler accessories are fitted
A) To measure steam properties B) To control steam inside the boiler
C) To improve the efficiency of the boiler D) None of these. **(04 Marks)**

b. With the help of simple line diagrams, show how solar energy, wind energy, hydel energy and tidal energy can be used as energy sources. **(08 Marks)**

c. List the various boiler mountings and accessories. **(03 Marks)**

d. Find the enthalpy of 1 kg of steam at 12 bar when steam is (i) dry saturated (ii) 22% wet and (iii) superheated to 250°C. Assume at 12 bar, steam has the following values: $T_s = 188°C$, $h_f = 798.43$ kJ/kg, $h_{fg} = 1984.3$ kJ/kg, specific heat of the superheated steam is 2.25 kJ/kg. **(05 Marks)**

2 a. Choose the correct answer :

i) The pipe which carries water from the reservoir to the turbine is called as
A) Tailrace B) Penstock C) Headrace D) Surge tank

ii) The pressure energy of steam is converted into the kinetic energy by
A) Blades B) Rotor C) Nozzles D) Draft tube.

iii) Method of reducing the rotor speed is known as
A) Supercharging B) Retardation C) Governing D) Compounding

iv) Flow of water through the runner, parallel to the axis of rotation of runner is known as
A) Tangential flow B) Radial flow C) Axial flow D) Mixed flow. **(04 Marks)**

b. Distinguish between the impulse and reaction turbines. **(08 Marks)**

c. List the important parts of a Pelton wheel and explain their functions. **(08 Marks)**

3 a. Choose the correct answer :

i) A connecting rod is a link between
A) Piston and the crankshaft B) Piston and the flywheel
C) Cylinder and the flywheel D) None of these.

ii) A diesel engine is
A) spark ignition engine B) compression ignition engine
C) external combustion engine D) None of these.

iii) The power developed inside the engine is called as
A) BHP B) FHP C) IHP D) MEP

iv) The function of a carburetor is to
A) provide air-fuel mixture B) supply pure air
C) supply fuel only D) cool the engine. **(04 Marks)**

b. With the help of a line diagram, explain the working of a four stroke petrol engine. **(08 Marks)**

c. The following observations were recorded during a test on a four stroke engine:
Bore = 25cm ; Stroke = 40 cm ; Crank speed = 250 rpm;
Net load on the brake drum = 700N ; Diameter of brake drum = 2m ;
Indicated mean effective pressure = 6 bar.
Determine : i) BP ii) IP iii) FP iv) Mechanical efficiency. **(08 Marks)**

4 a. Choose the correct answer :

i) The chilling or freezing unit of a refrigerator is called as
A) Compressor B) Evaporator C) Condenser D) Carburettor.

ii) Ratio of heat removed from a cold body to the work input is known as
A) Ton of refrigeration B) Coefficient of performance
C) Relative coefficient of performance D) Refrigeration effect.

iii) The function of an absorber is to
A) separate the vapour B) raise the pressure of the vapour
C) absorb the refrigerant vapour D) None of these.

iv) One ton of refrigeration is equal to
A) 1.5 kW B) 2.5 kW C) 3.5 kW D) 4.5 kW. **(04 Marks)**

b. Explain the following terms:
i) Refrigerant ii) Refrigerating effect
iii) Ton of refrigeration iv) Coefficient of performance. **(08 Marks)**

c. Distinguish between the vapour compression and vapour absorption refrigeration. **(08 Marks)**

PART – B

5 a. Choose the correct answer :

i) Which part of the lathe is engaged for thread cutting operation?
A) Lead screw B) Saddle C) Cross slide D) Apron

ii) Enlarging the existing hole to the required diameter is done by
A) drilling B) boring C) knurling D) turning

iii) The tailstock setover is related to
A) thread cutting B) plane turning C) taper turning D) knurling

iv) The helical groove on the twist drill bit is called as
A) flank B) shank C) tang D) flute. **(04 Marks)**

b. With the help of a sketch, indicate the specifications of a lathe. **(08 Marks)**

c. Sketch a radial drilling machine and explain its working. **(08 Marks)**

6 a. Choose the correct answer :

i) The milling cutter is mounted on the
A) saddle B) arbor C) column D) knee

ii) When the rotating cutter is fed against the advancing workpiece, it is called as
A) slab milling B) angular milling C) climb milling D) upmilling

iii) Removal of material by the mechanical action of abrasive particles is called as
A) slot milling B) grinding C) reaming D) tapping.

iv) Finishing the external cylindrical surface is carried out by
A) Lapping B) Honing C) Centreless grinding D) Angular milling. **(04 Marks)**

b. Sketch the following operations:
i) Upmilling ii) Down milling iii) Slot milling iv) Surface grinding. **(08 Marks)**

c. Explain the various abrasive materials used in the grinding operations. **(04 Marks)**

d. List the important specifications of an universal milling machine. **(04 Marks)**

7 a. Choose the correct answer :

i) Excess amount of acetylene is used for producing
A) Oxidizing flame B) Neutral flame C) Carburizing flame D) None of these.

ii) The melting point of a filler material in brazing is
A) Below 100°C B) 150°C to 400°C C) 450°C to 900°C D) 1000°C to 3000°C

iii) When the load is applied perpendicular to the axis of the shaft, the best choice to select
A) pivot bearing B) journal bearing C) bushed bearing D) thrust bearing

iv) The temperature at which the lubricating oil will cease to flow is known as
A) pour point B) cloud point C) flash point D) fire point. **(04 Marks)**

b. List the important properties of a good lubricant. **(06 Marks)**

c. Sketch the full pressure lubrication system. **(05 Marks)**

d. Explain the wick feed lubrication system. **(05 Marks)**

8 a. Choose the correct answer :

i) Suggest a pulley when a machine needs to be stopped and started intermittently.
A) Stepped cone pulley B) Jockey pulley
C) Fast and loose pulley D) Guide pulley.

ii) Sliding of belt between the pulley and the belt is called
A) creep B) slip C) tension D) pull.

iii) The preferred drive, when the centre distance is short
A) Chain drive B) Belt drive C) Rope drive D) Gear drive

iv) Drive used to convert a rotary motion into a linear motion is
A) helical gear B) bevel gear C) rack & pinion D) worm gear. **(04 Marks)**

b. Sketch and explain :
i) Open and cross belt drives ii) Stepped cone pulley. **(08 Marks)**

c. Classify the various types of gear drives and mention their uses. **(04 Marks)**

d. List the advantages of a V-belt over a flat belt. **(04 Marks)**

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